PATENT SPECIFICATION (11) 1389660

1389660

(21) Application No. 3793/71 (22) Filed 3 Feb. 1971
(23) Complete Specification filed 3 May 1972
(44) Complete Specification published 3 April 1975
(51) INT CL² B64F 1/02
(52) Index at acceptance B7G 7B3
(72) Inventor ERIC STYLES

(54) IMPROVEMENTS RELATING TO ARRESTER GEAR FOR AIRCRAFT

(71) We, THE SHERBORNE RUBBER CO., LIMITED a British Company of, Sherborne Street, Birmingham 16, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention is concerned with improvements relating to arrester gear for aircraft.

Conventional arrester gear for aircraft comprises a plurality of arrester cables extending across the runway, landing strip, deck or other area where an aircraft is to land (hereinafter referred to generically as the runway), the end parts of each arrester cable being wound on drums affording controlled resistance to rotation, or being mounted in some other manner which also resists in a predetermined manner the pulling out of the arrester cable. In use a hook is lowered from the aircraft which is about to land and engages an arrester cable. As the aircraft decelerates to a halt the arrester cable is pulled from a rectilinear shape to a V-shaped configuration.

In order that the arrester cables should be supported at a uniform short distance above the surface of the runway, and in order to avoid damage to the arrester cables as they are pulled out it is usual to provide supporting discs at intervals along each arrester cable. The discs are usually made from rubber and are often between about six inches and one foot in diameter.

In use the supporting discs are subjected to a considerable amount of wear. As an arrester cable is pulled out the discs initially roll or are dragged in a direction parallel with the principal planes of the discs, that is in a direction normal to the axes of the discs. As the movement of the arrester cable continues, however, the discs are dragged sideways to an increasing extent. Further, it sometimes happens that an aircraft wheel strikes the arrester cable or even one of the discs so that the discs are substantially flattened against the runway although the arrester cable remains horizontal. In consequence not only do the peripheral parts of the discs become rapidly damaged there is also a tendency for splits to occur in the discs and spreading outwards from their central holes. Eventually the discs break in pieces and become detached from the arrester cable. Sometimes the pieces are thrown violently from the arrester cable and strike parts of the landing aircraft or bystanders.

The present invention aims to reduce or avoid these dangers.

According to the present invention there is provided an aircraft arrester cable and a plurality of supporting discs for that cable, the cable passing through the centres of the discs, and at least one of the discs being formed as a moulding from rubber or a rubber-like material and characterised in that flexible retaining means of generally annular form is moulded into the disc and extends around the disc and around the cable, the retaining means being operative in use to assist in retaining the disc on the cable when the disc is damaged or broken in use.

The arrangement is such that in use, if the disc splits in any direction from the central hole to the periphery, and starts to come off the arrester cable, this movemnt is at least partially restrained by the retaining means.

It is to be understood that the term disc is used broadly to denote any generally disc-like roller whether or not its periphery is truly circular.

The retaining means preferably comprises at least one length of cord, cable or like flexible element of elongated shape. Although it would be possible to include more than one element in the moulding it is preferred to use a single length.

The element or at least one of the elements (where more than one is present) may be of endless configuration. Preferably the element is in the shape of an annulus, but it would be possible for it to be in the shape of a coil of two or more turns.

Alternatively the ends of the element may be not joined together, though the element

[*Price 33p*]

extends for at least one turn, and preferably at least two turns, around the disc. The arrangement can be made such that if the disc splits and starts to come off the cable the retaining means may be partially pulled from the disc and the split or broken disc is retained on the cable by a loop of the retaining means which extends beyond the periphery of the disc.

By way of example, a disc characteristic of the invention will now be described with reference to the accompanying drawings in which:—

Figure 1 is an axial view of the disc, and Figure 2 is a view of the disc sectioned about the diameter II—II of Figure 1.

The disc consists of a rubber moulding 1 and a retaining means 2 shown in dotted outline in Figure 1. The moulding is synmmetrical both about a central axis and about a central plane normal to the axis. The moulding has a hub portion 3 having a cylindrical bore 4 through which an arrester cable passes in use. The hub portion 3 is continuous with a web portion 5 which itself is continuous with a peripheral portion 6. The hub portion 3 and peripheral portion 6 are of the same maximum thickness in an axial direction and are thicker than the web portion 5. The peripheral portion 6 and the hub portion 3 taper towards the web portion 5, as indicated at 7 and 8 respectively, to join the web portion 5 smoothly thereby to avoid any sharp local changes in moulding thickness where splitting might tend to start. For the same reason, the outer edges 10 of the peripheral portion 6 and the inner edges 9 of the hub portion 3 are chamfered.

The retaining means 2 consists of a closed ring of flexible multi-strand steel cable extending circumferentially about the disc and moulded within the peripheral portion 6. For a disc of this type which is about six inches in diameter the cable may be about $\frac{1}{8}$" to $\frac{1}{4}$" in diameter having a breaking strain of approximately 10 cwt. and consisting of strands of steel wire, of for example 11 s.w.g. The cable may be wound from strands to form an endless ring, though it would be possible to form a ring by welding together the two ends of a short length of cable.

In use, a plurality of discs of the kind illustrated may be spaced at six foot intervals along a steel arrester cable (not shown) of about one inch diameter, the central holes in the discs being of slightly smaller diameter so that the discs are retained in position by friction. If a disc is flattened against the runway the hub portion 3 tends to remain substantially co-axial with the arrester cable while the peripheral portion 6 tends to become approximately parallel with the runway. In consequence the web portion 5 is highly distorted. Hitherto supporting discs have bean of substantially uniform thickness, with the result that they have been less flexible than these discs embodying the present invention and have been more liable to split. Nevertheless the discs embodying the invention do tend to split after a certain number of arresting operations. It is found, however, that instead of being thrown from the arrester cable the split disc or pieces of disc tend to remain attached to the arrester cable by the steel cable. Such a disc can then be removed from the arrester cable by cutting the cable of the disc with suitable cutters. The space left by the broken disc can be filled by sliding neighbouring discs along the cable. Spare discs may be threaded onto the end portions of the cable.

In a modification, not illustrated, the retaining means consists of a length of braided nylon cord of, for example, 600lbs breaking strain. The cord extends around the disc for at least two complete turns, and its ends are not joined together. In use, the cord is often partially pulled from the disc thereby absorbing most of the energy imparted to the disc when it is suddenly struck or deformed, the disc being retained on the arrester cable by a loop of the cord extending beyond the periphery of the disc and around the arrester cable.

WHAT WE CLAIM IS:—

1. An aircraft arrester cable and a plurality of supporting discs for that cable, the cable passing through the centres of the discs, and at least one of the discs being formed as a moulding from rubber or a rubber-like material and characterised in that flexible retaining means of generally annular form is moulded into the disc and extends around the disc and around the cable, the retaining means being operative in use to assist in retaining the disc on the cable when the disc is damaged or broken in use.

2. An aircraft arrester cable and supporting discs according to claim 1 in which the moulding of that disc or each of those discs that is provided with said retaining means comprises a hub portion, a peripheral portion and a radially intermediate web portion connecting the hub portion to the peripheral portion, the hub and peripheral portions each being axially thicker than the web portion.

3. An aircraft arrester cable and supporting discs according to claim 2 in which said retaining means is disposed in the peripheral portion of the moulding.

4. An aircraft arrester cable and supporting discs according to any of claims 1 to 3 in which said retaining means comprises at least one length of cord, cable or like flexible element of elongated shape.

5. An aircraft arrester cable and supporting discs according to claim 4 in which said element or at least one of said elements is of endless configuration.

6. An aircraft arrester cable and supporting discs according to claim 5 in which said endless element or each of said endless elements comprises a length of multi-strand steel cable shaped as an annulus.

7. An aircraft arrester cable and supporting discs according to claim 4 in which the ends of said element are not joined together, and said element extends for at least one turn around the disc.

8. An aircraft arrester cable and supporting discs according to claim 7 in which said element extends for at least two turns around the disc.

9. An aircraft arrester cable and a supporting disc for that cable, the disc being substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

BARKER, BRETTELL & DUNCAN,
Chartered Patent Agents,
Agents for the Applicants,
138 Hagley Road,
Edgbaston,
Birmingham B16 9PW.

Printed for Her Majesty's Stationery Office, by the Courier Press, Leamington Spa, 1975.
Published by The Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

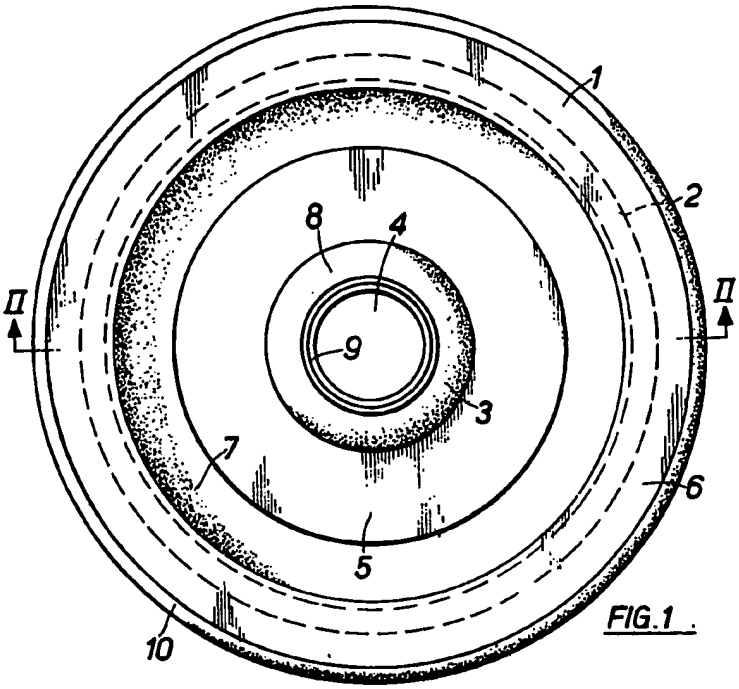

FIG.1.

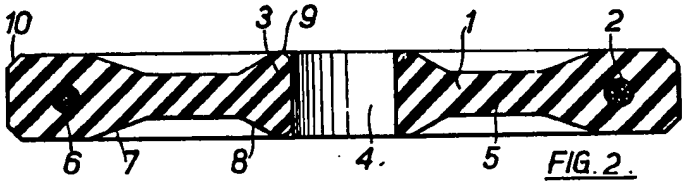

FIG.2.